### Science Investigations

**Chromatography** separates ink mixtures

**Distillation** separates liquids by boiling point

- **Solvent** moves up the paper
- **Ink dot**s
- **Solution**

<table>
<thead>
<tr>
<th>Separation technique</th>
<th>Property used for separation</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Attraction</td>
<td>magneticism</td>
<td>magnetic iron can be separated from non-magnetic sulfur using a magnet</td>
</tr>
<tr>
<td>Decanting</td>
<td>density or solubility</td>
<td>liquid water can be poured off (decanted) insoluble sand sediment less dense oil can be poured off (decanted) more dense water</td>
</tr>
<tr>
<td>Filtration</td>
<td>solubility, size of particles</td>
<td>sand can be separated from a solution of sodium chloride in water by filtration.</td>
</tr>
<tr>
<td>Evaporation</td>
<td>solubility and boiling point</td>
<td>soluble sodium chloride can be separated from water by evaporation</td>
</tr>
<tr>
<td>Dissolving</td>
<td>solubility</td>
<td>soluble salt can be separated from sand by dissolving into a solvent</td>
</tr>
<tr>
<td>Distillation</td>
<td>boiling point</td>
<td>ethanol can be separated from water by distillation because ethanol has a lower boiling point than water</td>
</tr>
</tbody>
</table>

### Mixtures can be separated physically

Graphs are used to show patterns in data more easily than a data table. Often processed (averaged) data is used.

**Speed of a toy car over 6 seconds**

- A well-drawn line graph must have the following features:
  - A suitable heading
  - Evenly spaced numbered axes
  - Labels with units
  - Correctly plotted line.

Use the acronym SALT when plotting graphs:
- **S**cales
- **A**xes
- **L**abelling
- **T**itle

### Drawing a line Graph

Scientific investigations are typically written up in a standard way under the following headings:

- **Aim (focus question):** what you are trying to find out or prove by doing the investigation
- **Hypothesis:** what you think will occur when an investigation is carried out
- **Equipment (or materials):** the things that you need to do the investigation
- **Method:** A simple, clear statement of what you will do – and can be repeated by another person
- **Results:** data, tables and graphs collected from investigation
- **Conclusion:** what your results tell you – linked back to the aim and hypothesis
- **Discussion:** Science ideas to explain your results, possible improvements to the investigation, how you managed to control the other variables.

### Solutions are Mixtures

**Solute**
- Substance dissolving
**Solvent**
- Liquid the solute dissolves in
**Solution**
- Solute dissolved in solvent

- **Air**
  - Made up of: Oxygen, other gases in nitrogen (gas, gas)
  - Solute: gas
  - Solvent: gas
- **Humid air**
  - Made up of: Water vapour in air (liquid, gas)
  - Solute: liquid
  - Solvent: gas
- **Mothballs**
  - Made up of: Naphthalene in air (solid, gas)
  - Solute: solid
  - Solvent: gas
- **Soda water**
  - Made up of: Carbon dioxide in water (gas, liquid)
  - Solute: gas
  - Solvent: liquid
- **Vinegar**
  - Made up of: Acetic acid in water (liquid, liquid)
  - Solute: liquid
  - Solvent: liquid
- **Ocean water**
  - Made up of: Various salts in water (solid, liquid)
  - Solute: solid
  - Solvent: liquid
- **Amalgam**
  - Made up of: Mercury in silver, tin, zinc (liquid, solids)
  - Solute: liquid
  - Solvent: solids
- **Brass**
  - Made up of: Zinc in copper (solid, solid)
  - Solute: solid
  - Solvent: solid

**Examples of solutions**

- **Chromatography** separates ink mixtures
- **Distillation** separates liquids by boiling point
Ideas for last minute study sheet

1. **10 questions.** Working in pairs. Each student uses the sheet to write 10 questions that could be answered with information on the sheet. The other student could have a different topic sheet. Focus on the students creating specific questions – rather than “what is an acid”, ask “what colour would acid turn blue Litmus paper”. Swap over the question sheets for the other partner to answer (without the sheet). Once finished, use the sheet to check answers. For any answers that are incorrect, use the sheet to correct them.

2. **Concept maps.** Students use the information on the sheet to create a large concept map.

3. **Scaffolded Practice Tests.** Create a short test, either paper or online (i.e. Kahoot, FORMS, Education Perfect), where the students are able to use the sheet to help. Repeat the test (or an alternative) the next day, without the information sheet.

4. **Sticky Notes.** Write summary statements, using information on the sheet, on small post it notes (digital or paper) and find the area of their notes to place it on.